

Stat 160 MidTerm Exam
Spring 2005
February 24, 2005
Form B

There are 25 problems. Select the best answer to each problem.

The next three questions refer to the following situation. Kelly Mittra works in a telemarketing agency. She calls 20 prospective credit card users in a day to try to sell them the new credit card that her company offers. According to her record, her success rate of convincing the customers is 30%. The following information will help in answering some of the questions:

```
Rweb:> # CUMULATIVE BINOMIAL DISTRIBUTION
Rweb:> pbinom(5, 20, .3) [1] 0.4163708
Rweb:> # BINOMIAL PROBABILITY
Rweb:> dbinom(5, 20, .3) [1] 0.1788631
Rweb:> # CUMULATIVE BINOMIAL DISTRIBUTION
Rweb:> pbinom(4, 20, .3) [1] 0.2375078
Rweb:> # CUMULATIVE BINOMIAL DISTRIBUTION
Rweb:> pbinom(8, 20, .3) [1] 0.8866685
Rweb:> # CUMULATIVE BINOMIAL DISTRIBUTION
Rweb:> pbinom(7, 20, .3) [1] 0.7722718
```

1. What is the probability that Kelly Mittra can convince at least 5 people to try the new credit card?
 - a) 0.2375078
 - b) 0.1788631
 - c) X 0.7624922
 - d) 0.4163708
2. What is the probability that from 5 to 8 people will be convinced by her to try the new credit card?
 - a) 0.355901
 - b) 0.4702977
 - c) X 0.6491607
 - d) 0.534764
3. How many customers in a day can she expect to try the new credit card?
 - a) 20
 - b) 0.3
 - c) X 6
 - d) 4.2

The next three questions refer to the following stem and leaf display which shows the final examination scores of students in a mathematics course. Note that a '*' separates the stem from its leaves. Also, the leaf 2 on stem 3 stands for the score 32.

```
2*5 7
3*2 4 4
4*1 1 7 9
5*0 3 3 6 8
6*0 1 2 4 4 7
7*2 2 3 5 5 6 8 9 9
8*0 0 4 5 7
9*0 0 6 7
```

4. What are the minimum, median and maximum scores respectively?
- a) 5, 65.5, and 9
 - b) X 25,65.5, and 97
 - c) 25,64.37 and 97
 - d) 0, 65.5, and 100
5. 75% of the students achieved below what score?
- a) X 79
 - b) 64
 - c) 60
 - d) 50
6. What percentage of students scored between 40 and 70?
- a) 25.0%
 - b) 50.0%
 - c) 100.0%
 - d) X 39.4%

The next three questions refer to the following situation. In a study to determine how skill in doing a complex assembly job is influenced by the amount of training, the estimated regression equation was obtained as follows:

$$\hat{Y} = 57.85 - 1.702X,$$

where X is the duration of training (in hours) and Y is the time to do the job (in minutes).

7. What is the predicted job time for 7 hours training?
- a) X 45.94 minutes
 - b) 20 minutes
 - c) 30.5 minutes
 - d) 10 minutes
8. The slope of the line means:
- a) As the duration of training increases by one hour, the time to do the job increases by 57.82 minutes
 - b) As the duration of training increases by one hour, the time to do the job increases by 1.702 minutes
 - c) As the time to do the job increases by one minute, the duration of training increases by 1.702 hours
 - d) X As the duration of training increases by one hour, the time to do the job decreases by 1.702 minutes
9. Compute the residual when $Y = 42.5$ minutes and $X = 10$ hours?
- a) 2.36
 - b) 2.41
 - c) X 1.67
 - d) 5.22

10. An urn contains 3 red balls, 2 blue balls and 5 green balls. The balls are identical except their colors. Suppose I draw 2 balls without replacement. What is the probability that the balls drawn are of same color?
- a) 0.06667
 - b) 0.0222
 - c) 0.38
 - d) X 0.311
11. The amount of alcohol in a certain beverage has mean of 2 ounces and a standard deviation of 0.2 ounces. If a 200 pound male has 16 ounces of this alcohol in 4 hours he is at the legal limit. If this man has 8 such drinks what is the probability that he over the legal limit? (Use the central limit theorem)
- a) Cannot be determined without Rweb output.
 - b) 1
 - c) X 0.5
 - d) 0
12. If the probability model of bearing diameter is approximately mound shaped what is the probability that a randomly selected bearing is between 1 and 2 standard deviations of the mean?
- a) X 0.27
 - b) 0.68
 - c) 0.995
 - d) 0.95

The next two problems refer to a random sample of size 2 which will be selected from the set of number $\{1, 2, 4, 7\}$. Consider the following trials:

Trial 1
1 4
Trial 2
2 4
Trial 3
4 7
Trial 4
1 7
Trial 5
1 2
Trial 6
7 7
Trial 7
2 7

13. Estimate the probability that the random sample contains at least one even number?
- a) X 0.714
 - b) 0.142
 - c) 0.241
 - d) 0.571

14. What is the error of the estimated probability for the previous problem?
- a) 0.923
 - b) 0.814
 - c) 0.2645
 - d) X 0.3415

The next 2 questions refer to the following situation. My favorite television program is Seinfeld. Assume I arrive home from school uniformly between 5:30 pm and 6:30 pm. Assume that Seinfeld begins at exactly 6:00 pm and ends at exactly 6:30 pm.

15. On a given day, what is the probability that I get to see some of the show?
- a) 0.5
 - b) 0
 - c) X 1
 - d) Depends on the time you get home.
16. What percentage of the time will I get to see the entire episode?
- a) 100%
 - b) X 50%
 - c) 75%
 - d) 25 %

The next two questions refer to the following situation. Suppose X is the number rolled on a biased tetrahedron (a four-sided solid) with numbers 1, 2, 3, and 4 on its sides. Suppose that the probability of 1 is 0.1, the probability of 2 is twice the probability of 1, and the probability of 3 is twice the probability of 2.

17. What is the probability of getting a 4?
- a) 0.7
 - b) X 0.3
 - c) Not enough information
 - d) 0.8
18. What is the mean, μ , of X ?
- a) Not enough information
 - b) 1.7
 - c) 0.89
 - d) X 2.9
19. Which of the following is true according to the central limit theorem?
- a) The more samples we obtain the larger the population mean becomes.
 - b) X The more samples we obtain the smaller the standard error of the mean.
 - c) The distribution of the sample mean is normal only if each of the observations comes from a normal distribution.
 - d) Professor McKean is responsible for you taking this course, not the central limit theorem.

The next three questions refer to the following situation: The average snowfall at Lambeau Field in Green Bay Wisconsin during the month of January is 12 inches with a standard deviation of 2 inches. Assuming a normal distribution use the following R-web output to answer the following questions about the amount of snowfall.

```
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(9, 12, 2)
[1] 0.0668072
```

```
Rweb:> # CUMULATIVE NORMAL DISTRIBUTION
Rweb:> pnorm(13, 12, 2)
[1] 0.6914625
```

```
Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(0.1, 12, 2)
[1] 9.436897
```

```
Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(0.25, 12, 2)
[1] 10.65102
```

```
Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(0.75, 12, 2)
[1] 13.34898
```

```
Rweb:> # NORMAL PERCENTAGE POINT
Rweb:> qnorm(0.9, 12, 2)
[1] 14.56310
```

20. What is the chance that between 9 and 13 inches fall upon Lambeau?

- a) -0.6246553
- b) X 0.6246553
- c) 0.0668072
- d) 0.6914625

21. What are the first and third quartiles?

- a) 9.44, 14.56
- b) 12, 2
- c) 0.067, 0.691
- d) X 10.65, 13.35

22. Ten percent of the time we can expect more than what amount of snowfall?

- a) 10.65
- b) X 14.56
- c) 13.35
- d) 9.44

23. Suppose Jim James rolled a die 100 times and he got this result.

x	1	2	3	4	5	6
Frequency	15	17	14	26	12	16

Estimate the probability of getting more than 4.

- a) 0.26
- b) 0.72
- c) 0.54
- d) X 0.28

24. Given a large data set is approximately mound shaped and 95% of the observations are between 100 and 200, estimate the standard deviation.

- a) 50
- b) X 25
- c) 150
- d) 625

25. Suppose that the number of to go orders of a certain restaurant is a Poisson random variable. The average to go orders in a day is 15.

```
Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(18, 15) [1] 0.8194717
Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(17, 15) [1] 0.7488588
Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(15, 18) [1] 0.2866529
Rweb:> # CUMULATIVE POISSON DISTRIBUTION
Rweb:> ppois(15, 17) [1] 0.3714537
```

What is the probability that the restaurant will receive less than 18 orders in any given day?

- a) 0.8194717
- b) X 0.7488588
- c) 0.3714537
- d) 0.2866529